ZOOLOGY.—*Emendation of the foraminiferal genus* Palmerinella *Bermudez, 1934, and erection of the foraminiferal genus* Helenia.

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During sampling of shallow water sediments off the west coast of Trinidad, B.W.I., Foraminifera belonging to the genus *Palmerinella* Bermudez, 1934, were found. Subsequent investigation showed that an emendation of the type species, *Palmerinella palmerae* Bermudez, and therefore of the genus, would be necessary. Examination of topotype material supplied by Dr. Bermudez and of the cotypes in the U. S. National Museum in Washington enabled the following redefinition to be prepared. A new subspecies, *Palmerinella palmerae diminuta*, has been based on the Trinidad specimens.

Also in Recent sediments from Trinidad was found a foraminifer which seemed worthy of description because of its distinct apertural characteristics. Being restricted to inshore brackish-water sediments, it was felt that if the species should subsequently be found in fossil assemblages an understanding of its nature would be of value paleoecologically. While this paper was in preparation the species was described by Warren (1957) under the name *Pseudoeponides anderseni*. However, the present writer does not agree with the assignment of this species to the genus *Pseudoeponides*, and it is here made the type species for the proposed new genus, *Helenia*.

Sincere thanks are due to Dr. Alfred R. Loeblich, of the U. S. National Museum, who arranged for the very fine drawings to be prepared by Mr. Lawrence and Mrs. Patricia Isham, scientific illustrators at the Museum, and communicated this note for publication to this JOURNAL. Thanks are also due to Dr. Hans Bolli for a critical reading of the manuscript and to the management of the Trinidad Oil Co. for permission to use their laboratory facilities.

Genus **Palmerinella** Bermudez, 1934, emended

Original reference.—Mem. Soc. Cubana Hist. Nat. **8** (2): 83, 1934.

Type species.—*Palmerinella palmerae* Bermudez, 1934.

Emended diagnosis.—Test free, trochospiral to almost planispiral; all chambers usually visible on the spiral side though early chambers may be partly or wholly obscured by a calcite plug; on the umbilical side, earlier chambers often obscured by a calcite plug. On the umbilical side supplementary chambers may be present between the chambers of the last whorl and the central plug though these are apparently sometimes obscured by the latter. Wall calcareous, perforate. Sutures curved, slightly depressed, flush with the surface or sometimes slightly raised. Aperture in the final chamber consisting of a pair of slits running almost the whole length of the terminal face and separated by a vertical septum; the slit towards the spiral side completely surrounded by a lip, that towards the umbilical side surrounded by a lip except at the interiomarginal end where it opens between the last chamber and the umbilical plug. On earlier chambers each slit aperture is closed by a calcite septum penetrated by pores.

Remarks.—Emendation of the type species of *Palmerinella* Bermudez necessitates a similar revision of the generic diagnosis. *Palmerinella* is most closely related to *Eponidella* Cushman and Hedberg, which it resembles in general shape of the test, wall structure, and presence of supplementary chambers on the umbilical side and from which it differs in apertural characters. In *Palmerinella* the aperture is always divided by a vertical septum, always opens onto the umbilical surface, and is closed by thin calcite septa in all but the last chamber, whereas in *Eponidella* the aperture, though interiomarginal extraumbilical in position in the early stages, is said to trend toward an areal position in the adult, is not divided by a vertical septum though there may be a tendency for a horizontal septum to appear and has not been recorded closed in early chambers.

Stainforth and Stevenson (1946) described *Palmerinella thalmanni* from the Miocene of

Ecuador; this species does not belong in the genus *Palmerinella*, as its aperture is a simple vertical slit in the centre of the terminal face of the chamber; it seems probable that this species should be removed to the genus *Ganella* Aurouze and Boulanger.

Palmerinella palmerae palmerae Bermudez, emended

Figs. 6a, 7

Palmerinella palmerae Bermudez, Mem. Soc. Cubana Hist. Nat. **8**(2): 83–86, figs. 1–3. 1934.

Emended diagnosis.—Test free, low trochospiral, almost planispiral in the adult and may even tend toward uniserial arrangement of last chambers in some large, possibly gerontic forms; all chambers usually visible on the spiral side though early chambers may be partly or wholly obscured by a semitransparent calcite plug; earlier chambers often obscured by a plug of calcite on the umbilical side; small supplementary chambers may be present between the chambers of the last whorl and the central umbilical plug though these are apparently sometimes obscured by the latter. Axial periphery rounded, equatorial periphery slightly lobate. Chambers numerous, 10 to 20 in the last whorl, with an average of 14 to 16. Wall calcareous, vitreous, coarsely perforate. Sutures distinct, curved, flush with the surface or slightly raised. Aperture on the final chamber consisting of a pair of slits running almost the whole length of the terminal face and separated by a vertical septum; the slit towards the spiral side completely surrounded by a prominent lip, the slit towards the umbilical side surrounded by a lip except at the interiomarginal end where it opens between the last chamber and the umbilical plug. In all earlier chambers, the two slit apertures are closed by thin calcite septa each penetrated by a linear series of round or elongate pores.

Greatest diameter of lectotype (here designated) (Cushman Coll. 22707a) 0.52 mm, thickness 0.17 mm, greatest diameter of figured paratype (Cushman Coll. 22707b) 0.6 mm, thickness 0.2 mm, greatest diameter of unfigured paratype (Cushman Coll. 22707c) 0.55 mm, thickness 0.17 mm.

Remarks.—The discovery in Trinidad of Foraminifera belonging to the genus *Palmerinella* Bermudez led the present author to realize that the species *Palmerinella palmerae* Bermudez had not been sufficiently fully described. Dr. Bermudez was kind enough to send topotype material to the author and to say that he would be pleased to see the species and genus redefined. During examination of the topotype material, it become apparent that the Trinidad specimens differed considerably from what had been described by Bermudez as *Palmerinella palmerae*; it seems necessary therefore to place them in a separate subspecies. The original types described by Bermudez from the Playa de Batabanó, Cuba are now regarded as belonging to the restricted subspecies, *Palmerinella palmerae palmerae* Bermudez, while the specimens from the west coast of Trinidad are made the basis for *Palmerinella palmerae diminuta* n. subsp.; notes on the differences between the two subspecies are given below in the remarks on the new subspecies.

Examination of the three cotypes erected by Bermudez and deposited in the collection of the U. S. National Museum in Washington showed that these exhibit well the apertural features of the species. On one specimen (Cushman Coll. 22707a) the final chamber is present and the two slit like apertures are open; this has been designated as the lectotype of *Palmerinella palmerae palmerae* (figs. 6a–c). The other two cotypes are broken specimens in which at least one of the chambers of the last whorl has been lost; both these specimens show the apertures closed by septa which are penetrated by rows of pores. These two cotypes are designated as paratypes (Cushman Coll. 22707b, 22707c), and one of them is illustrated here (Fig. 7).

Palmerinella palmerae palmerae has been seen by the present author only in material from the type locality as designated by Bermudez.

Locality.—Lectotype (Cushman Coll. 22707a) and paratypes (Cushman Coll. 22707b, c) from Playa de Batabanó, Province Habaná, Cuba.

Palmerinella palmerae diminuta, n. subsp.

Figs. 3–5c

Diagnosis.—Test free, low trochospiral, almost planispiral in the adult; all chambers usually visible on the spiral side, though early chambers may be obscured by a semitransparent calcite plug; on the umbilical side, early chambers often obscured by a calcite plug; small supplementary chambers are present between the chambers of the last whorl and the umbilical

plug. Axial periphery rounded, equatorial periphery slightly lobate. Chambers numerous, 10 to 14 in the last whorl, with an average of 12. Wall calcareous, vitreous, coarsely perforate. Sutures distinct, slightly curved, slightly depressed. Aperture of the final chamber consisting of a pair of slits running almost the whole length of the terminal face and separated by a vertical septum; the slit towards the spiral side completely surrounded by a prominent lip, the slit toward the umbilical side surrounded by a lip except at the interiomarginal end where it opens between the last chamber and the umbilical plug. In all earlier chambers, the two slitlike apertures are closed by thin calcite septa each penetrated by a linear series of rounded pores.

Greatest diameter of holotype (U.S.N.M. P6493) 0.33 mm, thickness 0.13 mm, greatest diameter of paratype (U.S.N.M. P6494a) 0.29 mm, thickness 0.13 mm, greatest diameter of paratype (U.S.N.M. P6494b) 0.32 mm, thickness 0.13 mm.

Remarks.—This subspecies differs from *Palmerinella palmerae palmerae* in its smaller average size, greater thickness relative to diameter, smaller average number of chambers in the last whorl (12 as against 14 to 16), less sigmoid sutures, less tendency to an increase in height of the last chamber, and a tendency for more involute coiling. Whereas in *Palmerinella palmerae palmerae* the supplementary chamberlets are often obscured by the umbilical plug, in *Palmerinella palmerae diminuta* they are normally distinct.

To the present time, all specimens of *Palmerinella palmerae* found in Trinidad belong to *Palmerinella palmerae diminuta*. They show less variation than do the Cuban examples of *Palmerinella palmerae palmerae*. It seems likely that the differences between the two subspecies may be due in large part to the differences in their habitats. From the original description by Bermudez (1934) of the localities in which *Palmerinella palmerae palmerae* is found, it would seem likely that the subspecies is living under conditions where the water, though brackish, is clear. On the other hand, at the type locality of *Palmerinella palmerae diminuta* the water is brackish and extremely turbid.

Occurrence.—Holotype (U.S.N.M. P6493) and paratypes (U.S.N.M. P6494a, b) from sample J.S. 190, north of Monkey Point, west coast of Trinidad, B.W.I. Sample taken in fine black silt from just below low-water mark about 20 feet from the outer edge of a mangrove swamp.

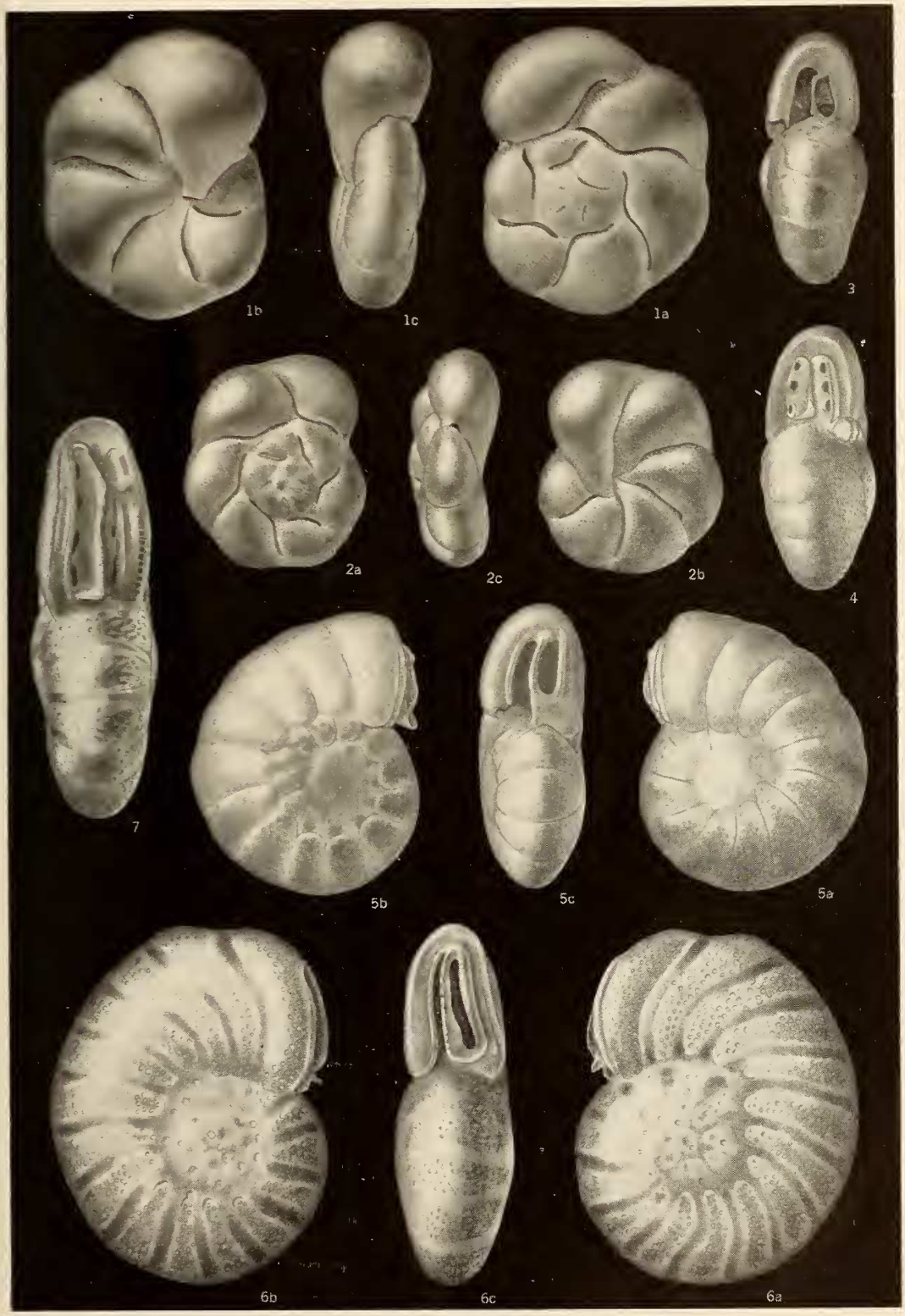
From the San Antonio Bay area of west Texas, Parker, Phleger, and Peirson (1953) figure specimens that compare closely with the Trinidad material.

From Matanzas Bay, Cuba, the author has seen specimens that fall within the subspecies *Palmerinella palmerae diminuta*.

FIGS. 1a–2c.—*Helenia anderseni* (Warren): 1*a*, Spiral view of hypotype (U.S.N.M. P6491) showing the deep folds between the chambers concealing the supplementary sutural apertures; 1*b*, umbilical view showing the deep folds between the chambers concealing the supplementary sutural apertures and the lobe of the last chamber extending across the umbilicus; 1*c*, edge view showing the low arched primary aperture at the base of the final chamber; × 138. 2*a*, spiral view of hypotype (U.S.N.M. P6492); 2*b*, umbilical view; 2*c*, edge view showing clearly the low arched primary aperture at the base of the final chamber; × 138.

FIGS. 3–5c.—*Palmerinella palmerae diminuta* Saunders, n. subsp.: 3, Edge view of paratype (U.S.N.M. P6494a) showing apertural condition in final chamber; × 138. 4, Edge view of paratype (U.S.N.M. P6494b) showing apertural condition in an earlier chamber of the last whorl; supplementary chambers are present between the chambers of the last whorl and the umbilical plug; × 138. 5*a*, Spiral view of holotype (U.S.N.M. P6493) showing early chambers obscured by a semitransparent calcite plug; 5*b*, umbilical view showing series of small supplementary chambers situated between the chambers of the last whorl and the umbilical plug; the prominent lip around the slit like aperture towards the spiral side of the terminal face of the last chamber is well shown; 5*c*, edge view showing paired longitudinal slit like apertures separated by a septum; the continuation of the aperture onto the umbilical side is clearly shown; × 138.

FIGS. 6a–7.—*Palmerinella patmerae palmerae* Bermudez emend. Saunders: 6*a*, Spiral view of lectotype (Cushman Coll. 22707a) showing early chambers visible through a semitransparent calcite plug; 6*b*, umbilical view showing early chambers almost entirely obscured by an umbilical plug; 6*c*, edge view showing pair of apertural slits separated by a septum; the slit toward the spiral side is completely surrounded by a prominent lip while that towards the umbilical side is surrounded by a less prominent lip except at the base where it opens between the last chamber and the umbilical plug; × 105. 7, Edge view of paratype (Cushman Coll. 22707b); the test is broken exposing the terminal face of one of the earlier chambers of the last whorl; the elongate slit apertures are closed by septa through which open linear series of pores; × 105.



Figs. 1–7.—(For explanation see opposite page).

Fossil examples of the subspecies received from Dr. Bermudez have been collected from the Las Salinas formation of Cuba of questionable Upper Miocene age, from the Pliocene of the Dominican Republic (Jimani formation) and Cuba and from the Pleistocene of Cuba.

Helenia Saunders, n. gen.

Type species.—*Pseudoeponides anderseni* Warren, 1957.

Test free, trochospiral, spiral side almost flat, umbilical side convex with umbilicus concealed below a lobe of the last chamber. Wall calcareous, perforate. Sutures on both spiral and umbilical sides curved and depressed. Primary aperture an irregular shaped single or multiple opening at the base of the final chamber; in earlier chambers an areal aperture may develop. Supplementary sutural apertures are present on both spiral and umbilical sides; they may be partly or wholly concealed in infolds of the test wall between the chambers. Early whorls of the spiral side show the sutural apertures remaining open.

Remarks.—The species described from Louisiana as *Pseudoeponides anderseni* Warren and which is well developed in Trinidad, is here made the basis of a new genus. In *Pseudoeponides* Uchio the supplementary apertures on the spiral side are placed areally on the chamber surfaces parallel to the sutures. It is possibly significant that *Pseudoeponides* is a marine form while the only known species of *Helenia*, n.gen. is entirely restricted to a brackish water, marsh environment. *Helenia* differs from *Mississippina* Howe in that its supplementary apertures occur along the sutures whereas in the latter genus they are parallel to the equatorial periphery on both spiral and umbilical surfaces. It differs from *Epistomaria* Galloway in that it lacks supplementary chambers on the umbilical side.

The genus is named for Dr. Helen Tappan Loeblich.

Helenia anderseni (Warren)

Figs. 1a–2c

Pseudoeponides anderseni Warren, Contr. Cushman Found. Foram. Res. **8**, pt. 1: 39, pl. 4, figs. 12–15. 1957.

Test small, trochospiral, involute umbilically with a very slightly lobate equatorial periphery; Spiral side almost flat; umbilical side convex with the umbilicus concealed below a lobe of the last chamber. Axial periphery rounded, equatorial periphery slightly lobate. Wall calcareous, fragile, semitransparent, finely perforate. Chambers slightly inflated spirally, more strongly so umbilically; 6 to 7 in the last whorl increasing in size gradually and regularly. Sutures on both spiral and umbilical sides curved, depressed. Primary aperture an irregular shaped single or multiple opening at the base of the final chamber; in earlier chambers a circular areal aperture commonly is developed in the middle of the terminal face. Supplementary sutural apertures are present on both spiral and umbilical sides; they are partly or wholly concealed in infolds of the test wall between the chambers. Early whorls visible on the spiral side show shortened portions of the supplementary apertures remaining open.

Greatest diameter of figured hypotype (U.S.N.M. P6491) 0.34 mm, thickness 0.13 mm, greatest diameter of figured hypotype (U.S.N.M. P6492) 0.25 mm, thickness 0.11 mm. Both hypotypes from sample J.S. 275, Carenage Swamp, west coast of Trinidad, B.W.I.

Remarks.—The Trinidad representatives of this species appear to be identical with those described by Warren (1957) from the coastal marshes of Louisiana.

In Trinidad, *Helenia anderseni* has so far only been found in numbers in the Carenage Swamp where it occurs in association with *Haplophragmoides manilaensis* Anderson, *Siphotrochammina lobata* Saunders, etc., in an inshore brackish water environment. Further notes on this locality may be found in Saunders, 1957, p. 3.

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